

4. A farmer raised 50 goats. He went to the marketplace with \$100.00 and traded the goats for sheep at a rate of 5 goats for every sheep. Then he traded the sheep for hogs at a rate of 4 sheep for 2 hogs each weighing 250 lbs. Finally, he traded the hogs for the going rate of \$55.00 per 100 lbs. How much money did the farmer take home?

5. A student measures a spherical balloon with a string and determines its circumference to be 64.0 cm. The balloon happens to be filled with  $\text{CO}_2$  gas. Calculate the following:

(a) The volume of the balloon in  $\text{m}^3$ .  $V = \frac{4}{3}\pi r^3$   $C = \pi d$  or  $2\pi r$  where  $r = \frac{C}{2\pi}$

$$\frac{4\pi}{3} \left( \frac{64.0 \text{ cm}}{2\pi} \right)^3 \left( \frac{1 \text{ m}}{100 \text{ cm}} \right)^3 = 0.0044267 \dots \rightarrow \boxed{4.43 \times 10^{-3} \text{ m}^3}$$

or  $0.00443 \text{ m}^3$

(b) The mass of the balloon in pounds.

(The density of  $\text{CO}_2$  is  $1.80 \text{ g/L}$ ; circumference =  $\pi d$ ;  $r = \frac{1}{2} d$ ;  $V_{\text{sphere}} = \frac{4}{3} \pi r^3$ )

$$D = \frac{m}{V} \quad m = DV$$

$$\frac{1.80 \text{ g}}{\text{L}} \left( \frac{1 \text{ kg}}{1000 \text{ g}} \right) \left( \frac{2.21 \text{ lb}}{1 \text{ kg}} \right) \left( \frac{1 \text{ L}}{1000 \text{ cm}^3} \right) \left( \frac{4\pi}{3} \right) \left( \frac{64.0 \text{ cm}}{2\pi} \right)^3 = 0.0175 \dots$$

$\boxed{0.0175 \text{ lb}}$   
or  $1.75 \times 10^{-2} \text{ lb}$

6. Chlorine is the most abundant element in seawater. Normal seawater has a density of  $1.0 \text{ g/mL}$  and contains  $19,000 \text{ mg}$  of chlorine per liter. How much chlorine (in kg) is in a sample of seawater that has a mass of  $1580 \text{ g}$ ?

Given

$$\text{Density}_{\text{sw}} = 1.0 \text{ g/mL}$$

$$1 \text{ L}_{\text{sw}} = 19,000 \text{ mg Chlorine}$$

$$\text{Mass}_{\text{sw}} = 1580 \text{ g}$$

Find

Kg chlorine

Useful

$$1000 \text{ g} = 1 \text{ kg}$$

$$1000 \text{ mL} = 1 \text{ L}$$

$$1000 \text{ mg} = 1 \text{ g}$$

$$D = \frac{m}{V} \quad V = \frac{m}{D} \quad 1580 \text{ g} \left( \frac{\text{mL}}{1.0 \text{ g}} \right) \left( \frac{1 \text{ L}}{1000 \text{ mL}} \right) \left( \frac{19,000 \text{ mg}}{1 \text{ L}} \right) \left( \frac{1 \text{ g}}{1000 \text{ mg}} \right) \left( \frac{1 \text{ kg}}{1000 \text{ g}} \right) =$$

$0.03002$   
 $\rightarrow \boxed{0.030 \text{ kg}}$   
or  $3.0 \times 10^{-2} \text{ kg}$

7. The United States produces about 380,000 metric tons of aluminum per month. If the density of aluminum is 2.7g/cm<sup>3</sup>, how many cubic centimeters of aluminum does this represent?

(1 metric ton = 2200 lbs)  $D = \frac{m}{V}$   $V = \frac{m}{D}$

$$\underbrace{380,000 \text{ mt} \left( \frac{2200 \text{ lb}}{1 \text{ mt}} \right) \left( \frac{1 \text{ kg}}{2.2 \text{ lb}} \right) \left( \frac{1000 \text{ g}}{1 \text{ kg}} \right)}_{\text{mass in g}} \underbrace{\left( \frac{1 \text{ cm}^3}{2.7 \text{ g}} \right)}_{\text{density}} = 1.4074... \times 10^{11}$$

$1.4 \times 10^{11} \text{ cm}^3$

8. The density of lead is 11. g/cm<sup>3</sup>, and you have a 50.0lb rectangular sheet of the metal. Two sides are measured to be 3.0cm and 4.0cm. What is the length, in feet, of the sheet?

$D = \frac{m}{V}$   $V = \frac{m}{D}$   $L = \frac{V}{wh}$   $w = \text{width}$   
 $h = \text{height}$

$$50 \text{ lb} \left( \frac{1 \text{ kg}}{2.2 \text{ lb}} \right) \left( \frac{1000 \text{ g}}{1 \text{ kg}} \right) \left( \frac{\text{cm}^3}{11 \text{ g}} \right) \left( \frac{1}{3.0 \text{ cm} \times 4.0 \text{ cm}} \right) \left( \frac{1 \text{ in}}{2.54 \text{ cm}} \right) \left( \frac{1 \text{ ft}}{12 \text{ in}} \right) = 5.6488...$$

$5.6 \text{ ft}$

More Challenging Factor Label Problems

## homework set #9:

- You and two friends decide to go to Mexico City from El Paso, TX where y'all live. You volunteer your car if everyone chips in for gas. Someone asks how much the gas will cost per person on a round trip. Your first step is to call your smarter brother to see if he'll figure it out for you. Naturally he's too busy to bother, but he does tell you that it is 2015 km to Mexico City, there's 11 cents to the peso, and gas costs 5.8 pesos per liter in Mexico. You know your car gets 21 miles to the gallon, but we still don't have a clue as to how much the trip is going to cost each person in dollars. (1mi = 1.6 km)